



Impact of Spirulina Supplementation on Triglyceride and Serum Cholesterol Level of HIV Infected Patient

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ABSTRACT : Dyslipidemia is common syndrome seen in HIV infected patient due to various reasons like adverse effect of drug, higher catabolic rate, reduced functioning of body organs and reduced immune functioning which contributes adversely to overall cardio-vascular risk profile of the patient. Hence, study was under take to determine the impact of Spirulina supplementation on the lipid profile of HIV infected patients. Patients were followed up at regular interval of two weeks to assure that they take regular Spirulina supplementation, to develop good rapport and to stop dropout rate. During course of study patients were advised to continue their medical prescription. Data was compiled and the results were analyzed using suitable software and appropriate statistical methods. Result stated that triglyceride level increased by 21.35 mg/dl (male) and 17.11 mg/dl (female) in control group. Same time triglyceride level found to be reduced significantly in treatment group by 11.51 mg/dl (male) and 16.7 mg/dl (female). Serum cholesterol level in control group found to be increased by 12.6 mg/dl (male) and 8.66 mg/dl (female), but serum cholesterol decreased by 14.8 mg/dl (male) and 13 mg/dl (female) in HIV patients receiving Spirulina supplementation.

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KEY WORDS :

Spirulina
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Triglyceride, Serum,
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The term acquired immunodeficiency syndrome (AIDS) was used to describe the condition. Infectious micro-organism responsible for condition was transmittable _ through sexual contact and/or through blood transfusion (MMWR, 1981; Fauci, 2003 and Hoffman, 2004). HIV-infected patient is at nutritional risk at any point in their illness. Severe under nutrition, weight loss, particularly loss of lean tissue and delayed weight gain and height velocity in children are commonly encountered. Elevated levels of triglyceride

and serum cholesterol are common symptoms seen in HIV infected patient leading to increased cardiac risk (Judith Nerad *et al.*, 2003).

Spirulina (Cyanobacterium) is a blue green algae which exist as a single cell organism. It is believed to be first living organism on earth that converts sunlight into food or life energy by process of photosynthesis in the presence of sunlight and water. It has evolution history of more than 3.6 billion years (Nelissen *et al.*, 2002) Cyanobacterium

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Spirulina (*Spirulinaplatensis*) represents larger group of blue green algae of prokaryotic kingdom. This single cell protein (SCP) are oldest oxygen photosynthetic organism known so far and are rich source of novel bioactive metabolites including many cytotoxic, antifungal and antiviral compound (Rajbir *et al.*, 2004). Sulfated-polysaccharide, calcium spirulan (Ca-SP) isolated from *Spirulina platensis* found to inhibits the replication *in vitro* of several enveloped viruses including Herpes simplex type I (HSV-1), human cytomegalovirus (HCMV), measles virus, mumps virus, influenza A virus and HIV-1 virus. (Hayashi *et al.*, 1993). Keeping this in mind the research study was designed to formulate and prepare of spirulina nutraceuticals and see its impact on lipid profile on HIV patients.

RESEARCH METHODOLOGY

This was a prospective study conducted over a period of 6 month. The study included 62 confirmed HIV positive patients. HIV patients were divided in to two groups T₀ (Control group) and T₁ (Treatment group) which received supplementation of 5 g/day of Spirulina powder in capsule form for period of six months. T₀ (Control group) include 20 male and 9 female and T₁ (Treatment group) included 23 male and 10 female. Blood sample of all HIV patients was analyzed for triglyceride and serum cholesterol level at beginning of study and at the end of study.

Statistical methods :

Descriptive statistical analysis was carried out in this study using software SPSS 15.0. Results on continuous measurements were presented as mean \pm SD. Significance was assessed at 5 per cent level, 't' test and 'p' value was used to find the significance of study.

RESULTS AND DISCUSSION

One of the principle drivers behind increase in the risk of cardio-vascular disease in HIV infected patients is dyslipidemia. The characteristic pattern of dyslipidemia induced elevated triglycerides (40-80%), elevated LDL cholesterol (40-80%) and total cholesterol (10-50%) (Riddler *et al.*, 2007). Lipid-lowering effects of Spirulina has been reported by many researchers. Significant reduction in blood triglyceride was seen in 37 type 2 diabetes mellitus patients when supplemented with 8 g/day of freeze dried Spirulina. Triglyceride level reduced from 125.8 mg/dl to 98.5 mg/dl in period of three months. (Lee *et al.*, 2008). In male control group (T₀) triglyceride level at beginning of study was 154.95 mg/dl which raised to 176.3 mg/dl this significant rise of triglyceride having mean difference of +21.35 mg/dl yielded 'p' value of 0.0127. Significant reduction in triglyceride level was seen in T₁ group having p-value of 0.027 where triglyceride level decreased from 160.9 mg/dl to 149.39 mg/dl showing mean difference of -11.51 mg/dl. In female control group (T₀) triglyceride level found increased from

Table 1 : Effect of Spirulina supplementary on Triglyceride of HIV infected patient

Gender	Treatments	Parameter	Mean before	Mean after	Mean difference	S.E. of difference	teal	'p' value
Male	T ₀	Triglyceride	154.95	176.3	+21.35	8.158	2.62	0.0127 *
	T ₁	Triglyceride	160.9	149.39	-11.51	8.965	2.288	0.027 *
Female	T ₀	Triglyceride	163. c	180.11	+ 17.11	14.16	1.21	0.245 IMS
	T ₁	Triglyceride	167.4	150.7	-16.7	10.49	1.994	0.047 *

* indicate significance of value at P=0.05, NS = Non-significant, The result is significant at p < 0.05, T₀- Control, T₁- Spirulina supplementation

Table 2 : Effect of Spirulina supplementary on Serum cholesterol level of HIV infected patient

Gender	Treatments	Parameter	Mean before	Mean after	Mean difference	S.E. of difference	teal	'p' value
Male	T ₀	Serum cholesterol	175	187.6	+12.6	9.112	1.4102	0.166 NS
	T ₁	Serum cholesterol	179.5	164.7	-14.8	9.426	1.57	0.124 NS
Female	T ₀	Serum cholesterol	182.78	191.44	+8.66	12.17	0.712	0.487 NS
	T ₁	Serum cholesterol	190.5	177.5	-13	11.97	1.086	0.29 NS

Significant at P=0.05 level, NS = Non-significant, The result is significant at p < 0.05, T₀- Control, T₁- Spirulina Supplementation



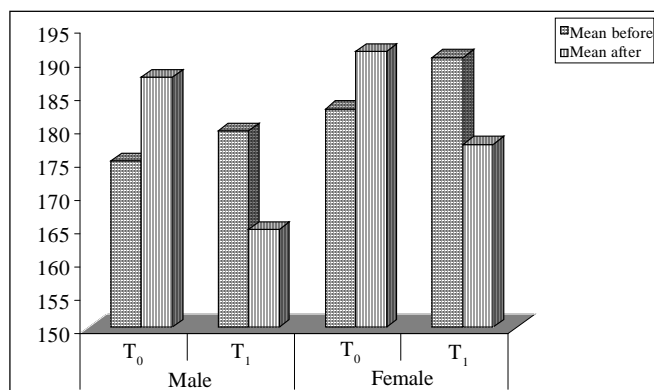


Fig. 1 : Graphical representation of effect of spirulina supplementary on serum cholesterol level of HIV infected patient

163 mg/dl to 180.11 mg/dl having mean difference of +17.11 mg/dl which was statistically non-significant. Significant decrease in triglyceride level was seen in T₁ group where triglyceride level reduced from 167.4 mg/dl to 150.7 mg/dl having mean difference of -16.7 mg/dl and 'p' value of 0.047.

Spirulina supplementation showed reduction in serum cholesterol level when given to hypercholesterolemic patient. Significant reduction in serum cholesterol by 63.3 mg/dl and 103.7 mg/dl was seen in hypercholesterolemic patient when they were supplemented with 2 g and 4 g of Spirulina for period of three months (Ramamoorthy and Premkumar, 1996). Abnormalities in lipid metabolism of persons infected with HIV virus potentially induced by the disease itself and also by the medications used to treat the disease; were first reported in the early 1990s. Hypertriglyceridemia and a decrease in total cholesterol and HDL cholesterol occur in advanced phases of HIV infection are considered as markers of chronic inflammation (Grunfeld, 2010). Degradation of fat tissue is common phenomena seen HIV infected patient leading to increase in serum cholesterol level. In male serum cholesterol found to increasing in T₀ group from 175 mg/dl to 187.6 mg/dl having mean difference of 12.6 mg/dl. T₁ group showed reduction in serum cholesterol level from 179.5 mg/dl to 164.7 mg/dl having mean difference of -14.8 mg/dl. In female serum cholesterol found to increasing in T₀ group from 182.78 mg/dl to 191.44 mg/dl having mean difference of +8.66 mg/dl. T₁ group showed reduction in serum cholesterol level from 190.5 mg/dl to 177.5 mg/dl having mean difference of -13 mg/dl.

dl. Results clearly indicated that Spirulina supplementation along with therapeutic dietary treatment help in reducing serum cholesterol level. When collected data put for statistical analysis results were found to be non significant.

Conclusion :

Thus, it can be concluded that Spirulina (blue green algae) supplementation is effective in controlling triglyceride and serum cholesterol level of HIV infected.

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